



Nitrogen isotope investigations in the Eastern Mediterranean Sea

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The Eastern Mediterranean Sea is a highly oligotrophic oceanic environment in which the export production of organic matter from the pelagic zone is exceedingly low ($6 - 12 \text{ g C m}^{-2} \text{ a}^{-1}$). The physical circulation in this ecosystem is a typical anti-estuarine system that effectively exports nutrients from the Eastern Mediterranean Sea and make it a nutrient desert. Because of its oligotrophic status, the Eastern Mediterranean Sea persists largely on regenerated nutrients, in which dissolved organic nutrients (dissolved organic nitrogen, DON, and dissolved organic phosphorous, DOP) may be of major importance. For a better understanding of the biogeochemical cycle of nitrogen in the Eastern Mediterranean Sea we measured nutrient concentrations and isotopic ratios $\delta^{15}\text{N}$ of nitrate and DON of water samples from vertical profiles of 17 stations occupied during cruise Meteor 71-3 in January 2007.

Our results show that DON has high concentrations in water depths above 200 m. Generally DON concentration was about $2-3 \mu\text{M}$, but maxima of $9 \mu\text{M}$ also occurred. In deeper water layers DON concentrations were very low ($< 0.5 \mu\text{M}$). Nitrate concentrations were anti-correlated to DON, with $< 1 \mu\text{M}$ in surface waters and $4-6 \mu\text{M}$ in deeper layers, ammonia concentrations were stable around $1 \mu\text{M}$ in the water column, independent of depth.

In samples with measurable nitrate concentrations, the $\delta^{15}\text{N}$ of nitrate was nearly constant between 1.5 - 3 permil below 200 m water depth, with lower values in the shallow waters. $\delta^{15}\text{N}$ of DON did not have a distinct trend with depth and generally ranged

from 3 – 6 permil, $\delta^{15}\text{N}$ of particular organic nitrogen (PON) is 0.5 – 1 permil higher (4 – 7 permil). These results suggest that the enrichment of ^{15}N in DON and PON compared to nitrate is due to fractionation of primary biomass during the passage through the water column. This process leads to the development of a ^{15}N enriched nitrogen pool in the Easter Mediterranean Sea.